

**DIRECT TESTIMONY OF**  
**THOMAS E. HANZLIK**  
**ON BEHALF OF**  
**DOMINION ENERGY SOUTH CAROLINA, INC.**  
**DOCKET NO. 2019-393-E**

1   **Q.   PLEASE   STATE   YOUR   NAME,   BUSINESS   ADDRESS,   AND**  
2       **OCCUPATION.**

3   A.       My name is Thomas “Tom” E. Hanzlik. My business address is 220  
4       Operation Way, Cayce, South Carolina. I am the Manager of System Control for  
5       Dominion Energy South Carolina, Inc. (“DESC”).

7   **Q.   BRIEFLY   STATE   YOUR   EDUCATION,   BACKGROUND,   AND**  
8       **EXPERIENCE.**

9   A.       In 1981, I graduated from Clemson University with a Bachelor of Science  
10       degree in Electrical and Computer Engineering. I began my career with DESC in  
11       1987 when I accepted a job with South Carolina Electric & Gas Company.<sup>1</sup> I served  
12       in various roles during my career at DESC, including but not limited to: Manager  
13       of Operations Planning; Manager of Large Customer Accounts; General Manager

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<sup>1</sup> In April of 2019, South Carolina Electric & Gas Company changed its name to DESC.

1 of Instel Inc. (a SCANA Subsidiary); and Power Quality Engineer. For the last 7  
2 years, I have worked in my current role as the Manager of System Control Center.

3  
4 **Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC SERVICE**  
5 **COMMISSION OF SOUTH CAROLINA (“COMMISSION”)?**

6 A. Yes, I previously appeared before the Commission and testified in Docket  
7 No. 2019-184-E, DESC’s avoided cost docket.

8  
9 **Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?**

10 A. As Manager of System Control, the purpose of my direct testimony is to  
11 discuss how DESC accounts for real-time system conditions and dispatches  
12 generating resources and existing storage resources to maintain reliability and  
13 optimize efficiency. Specifically, I will discuss how DESC can draw upon its  
14 experience operating its own fleet to optimize battery storage facilities and obtain  
15 the maximum benefit for DESC’s customers.

16  
17 **Q. PLEASE BRIEFLY DESCRIBE HOW DESC PLANS ITS SYSTEM,**  
18 **INCLUDING THE DISPATCH OF ITS GENERATION.**

19 A. I receive a day-ahead plan from our Economic Resource Commitment  
20 (“ERC”) group. As DESC Witness Bell’s testimony explains, the ERC group  
21 models hourly load forecasts and the associated generation required to meet that  
22 forecasted load while considering known reliability needs. This constrained unit

1 commitment plan is known as the Balancing Integrated Operational Plan (“BIOP”),  
2 and it provides a unit commitment, dispatch, and reserve plan. Although the ERC  
3 group produces a 16-day BIOP, the version my group receives is only for day-ahead  
4 and intraday operations. It includes hourly forecasted loads, planned generation  
5 dispatch listed in the most cost-efficient order, and the target water levels for Lake  
6 Monticello which determine the operating limits associated with pumping and  
7 generating Fairfield Pumped Storage (“Fairfield”). The BIOP allows DESC to  
8 optimize the generation assets on its system to meet expected load profiles based  
9 upon forecasted system conditions. As such, my group begins daily operations  
10 according to the BIOP, and adjusts these operations to meet real-time conditions  
11 that vary from forecasted conditions in the BIOP. These variations and  
12 accompanying uncertainty have increased recently with the addition of solar on  
13 DESC’s system and have resulted in an increased need for operating reserves. The  
14 uncertainty and need for operating reserves will continue to increase if storage  
15 facilities are dispatched in an independent and uncoordinated manner, as discussed  
16 below.

17  
18 **Q. PLEASE EXPLAIN HOW DESC’S EXPERIENCE DISPATCHING ITS**  
19 **RESOURCES MAKES IT UNIQUELY QUALIFIED TO OPTIMIZE**  
20 **BATTERY STORAGE.**

21 A. DESC operates a fleet of generation assets on a daily basis in a way that  
22 maximizes the benefit to the grid and DESC’s customers. This involves not only

1 fleet-wide planning and resource allocation on a nearly instantaneous basis, but also  
2 adaptation of DESC's operations in real-time to address deviations from hourly  
3 forecasted conditions in the BIOP, such as unplanned transmission outages,  
4 unplanned generation outages, changes in weather conditions (ranging from routine  
5 to natural disasters), and unplanned generation shifts, which have increased with the  
6 addition of weather-dependent variable solar. This means that DESC has extensive  
7 experience dispatching generation in real-time to maintain system balance during  
8 periods of "normal operation"—which require adjustments even a detailed forecast  
9 that is updated hourly cannot anticipate—as well as addressing deviations such as  
10 extreme weather events. This experience makes it uniquely qualified in terms of  
11 balancing, resource allocation, and real-time response in a way that is matched by  
12 few, if any, storage facility operators.

13 Additionally, the sheer amount of solar on DESC's system requires a  
14 considered and coordinated dispatch of these uncontrolled facilities so that they  
15 provide maximum value to DESC's customers. For example, through the summer  
16 of 2019, the maximum hourly output of solar generation on DESC's system was  
17 approximately 450 MW, and the combined ramp rate of these solar facilities was  
18 approximately the same as the ramp rate of the load on DESC's system. However,  
19 solar generation connected to DESC's system for the summer of 2020 is projected  
20 to be in excess of 800 MW and will continue to approach 973 MW. At those levels,  
21 the daily ramp rate of solar generation would exceed the daily ramp rate of the load  
22 on DESC's system—meaning solar generation will be increasing production at a

1 rate faster than load is increasing on DESC's system. As a result, DESC must carry  
2 additional operating reserves during daylight hours to maintain reliability.

3 Battery storage can be counted on to meet some of the increased operating  
4 reserve levels due to uncontrolled solar generation, but only if charge and discharge  
5 periods can be altered on very short notice. Similarly, battery storage is able assist  
6 with other aspects of uncontrolled solar generation, like minimum load issues. The  
7 addition of storage should reduce the level of future curtailments due to low load  
8 conditions. However, these facilities must be properly planned for, integrated into  
9 DESC's system, and dispatched in a manner that benefits the system as a whole. To  
10 properly mitigate those difficulties, storage facilities would need to charge and  
11 discharge in a controlled and coordinated manner to reduce the amount of solar  
12 generation curtailed in order to maintain a balanced system. As DESC Witness  
13 Kassis explains in his testimony, providing dispatch signals to Storage QFs would  
14 better ensure that all of DESC's customers are able to benefit from each of these  
15 facilities in a manner commensurate with the avoided cost revenue paid to each  
16 Storage QF.

17  
18 **Q. WHAT EQUIPMENT AND COMMUNICATION DEVICES ARE**  
19 **REQUIRED FOR DESC TO COMMUNICATE WITH THE STORAGE**  
20 **QFS?**

21 **A.** DESC would design the communication systems and algorithms to provide  
22 dispatch signals in real-time—just as it does for its own generation. All

1 communications would be initiated from DESC's Energy Management System in  
2 DESC's System Control and travel through a series of DESC-owned switches and  
3 routers with firewall protection to DESC's remote terminal unit, which will  
4 communicate directly with the battery storage control system. These systems will  
5 allow DESC to acquire real-time information from the battery (which would include  
6 information such as ramp rates, operating limits, and current state of charge) and to  
7 provide optimal dispatch signals to the Storage QF (charging and discharging at  
8 optimal times).

9  
10 **Q. WHAT ARE THE BENEFITS OF HAVING DESC PROVIDE DISPATCH**  
11 **SIGNALS TO STORAGE QFS, RATHER THAN ALLOWING EACH**  
12 **FACILITY TO OPERATE INDEPENDENTLY?**

13 A. As discussed above, DESC has comprehensive knowledge of its system and  
14 how to operate assets on its system to maximize reliability and economic benefits  
15 to DESC's customers. As part of this operation, DESC receives and responds to  
16 real-time data regarding system events. If the battery storage facilities on DESC's  
17 system were operated independently by third-party owners or their agents, it is likely  
18 that each facility would be operated in a way that attempts to maximize revenues  
19 for that specific facility, regardless of the needs of the system as a whole. That  
20 statement is not meant to be a slight to the individual operators. However, these  
21 operators have different incentives and do not have a real-time, system-wide view.  
22 As a result, although they could operate according to forward-looking plans, they

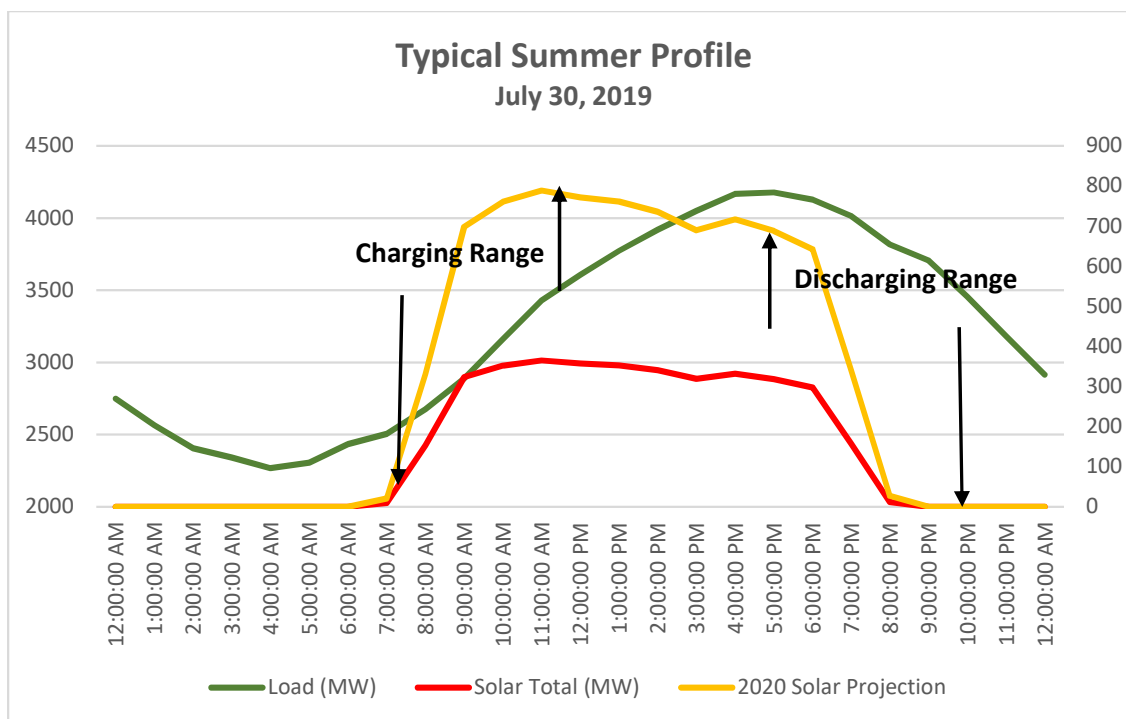
1 are unable to effectively adjust, and may not have the incentive to adjust, to real-  
2 time conditions like DESC. In short, the storage facilities provide much more value  
3 when they are dispatched in coordination to meet system needs rather than when  
4 operated only in response to the conditions at a single associated solar facility.

5  
6 **Q. IS IT EQUALLY IMPORTANT FOR DESC TO SIGNAL WHEN TO**  
7 **CHARGE THE STORAGE QF IN ADDITION TO WHEN TO DISCHARGE**  
8 **THE STORAGE QF?**

9 A. Yes. By allowing DESC to signal charges and discharges, DESC is able to  
10 balance its system more efficiently and optimize these facilities. This is particularly  
11 true during atypical conditions—whether occurring in the summer or the winter.

12  
13 **Q. CAN YOU PROVIDE AN EXAMPLE OF HOW DESC PLANS TO UTILIZE**  
14 **BATTERY STORAGE FOR A TYPICAL SUMMER PROFILE?**

15 A. Yes. The graph below shows actual data from a summer day in 2019 and  
16 includes the forecasted solar generation for the summer of 2020.



This is a typical summer profile, which will be similar for much of the spring and fall seasons—however, the actual times and duration of time for charging and discharging will change. For example, prior to daylight savings time, discharge will start and end earlier and there will not be as much time for charging.

For a typical summer morning, the ramp rate by which solar generation increases may exceed the ramp rate by which load increases for the same period. During this period, solar generating units would be able to charge associated battery storage units. This would help to reduce the amount of solar generation on the grid in the morning and assist DESC in maintaining a balanced system—which will be increasingly important given the growth in solar projected for 2020. However, as discussed more fully by DESC Witness Bell in his testimony, in order to fully charge the battery for time-shifting, there would still be periods during the day when

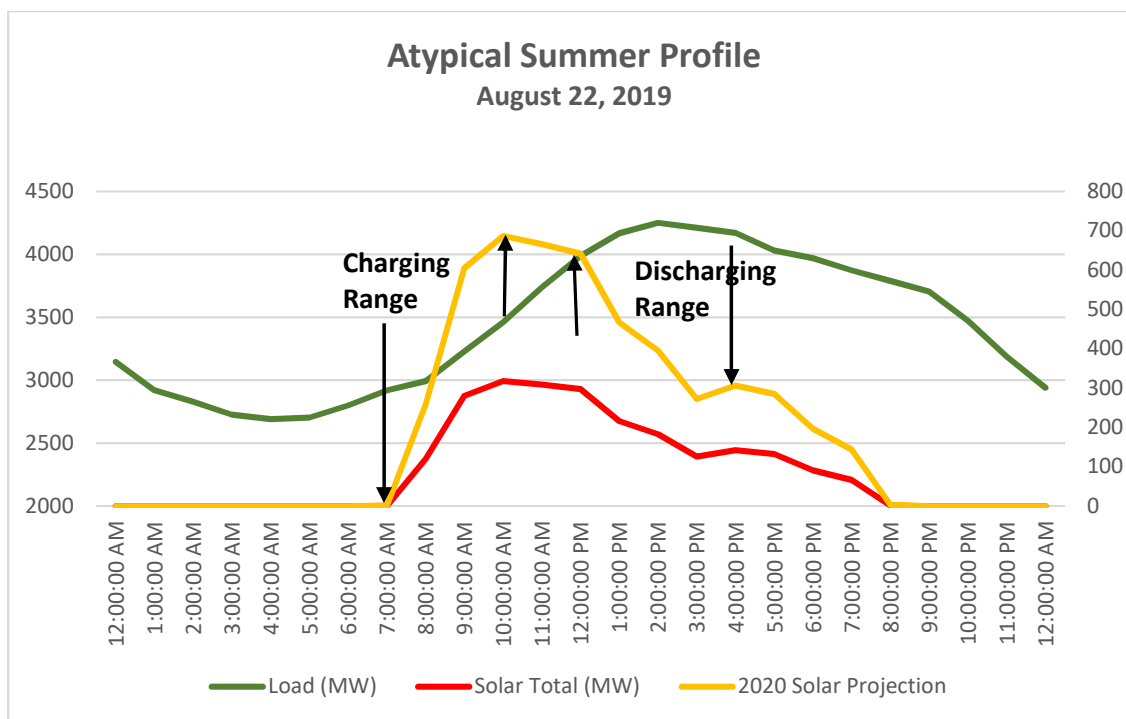


1 generation from “qualifying facilities” would have to be pulled from serving load  
2 in order to fully charge associated battery storage facilities.

3 For a typical summer afternoon, solar generation decreases more quickly  
4 than load, and storage units would be discharged to fill the void left by decreasing  
5 solar generation to assist DESC in maintaining a balanced system. The dispatch of  
6 stored MW would typically occur for up to 4 hours at a time between 5:00 P.M. and  
7 10:00 P.M., subject to DESC’s then-current mix of on-line generation.

8  
9 **Q. CAN YOU EXPLAIN HOW THE USE OF BATTERY STORAGE ON AN**  
10 **ATYPICAL SUMMER DAY WILL DIFFER FROM A PLANNED SUMMER**  
11 **DAY?**

12 Yes. The graph below shows actual data from an atypical summer day in  
13 2019 and includes the forecasted solar generation in the summer of 2020.

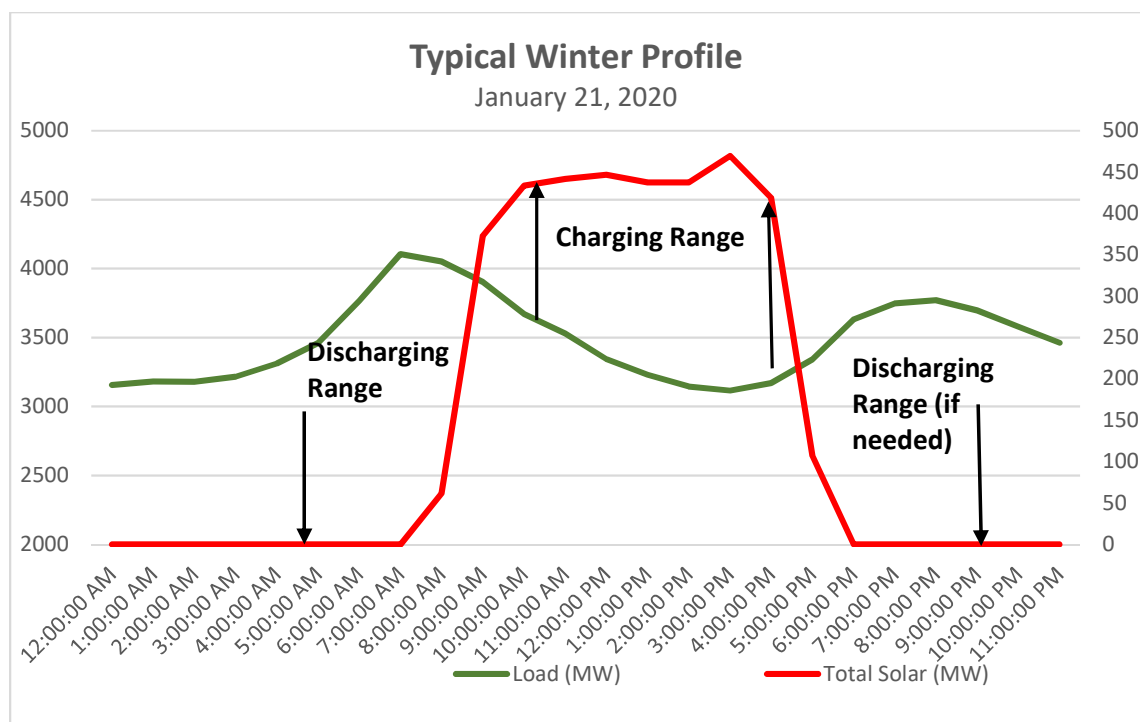


On this day, early cloud cover led to afternoon thunderstorms, which resulted in decreased solar generation. In contrast to a typical summer day, this scenario requires the discharging of storage earlier in the day when the output from solar generation is decreasing and load continues to increase. During this time, storage units would be discharged to fill the void left by the rapid drop of solar generation and assist DESC in maintaining a balanced system.

It is important to note that the day-ahead load forecast for both the typical and atypical day would have looked very similar, if not identical. Therefore, if DESC does not have the ability to react to these deviations in real-time and provide dispatch signals to these facilities, achieving optimization of these assets is nearly impossible.

**Q. CAN YOU PROVIDE AN EXAMPLE OF HOW DESC PLANS TO UTILIZE BATTERY STORAGE FOR A TYPICAL WINTER PROFILE?**

**A.** Yes. The graph below shows actual data from a typical winter day in 2020.

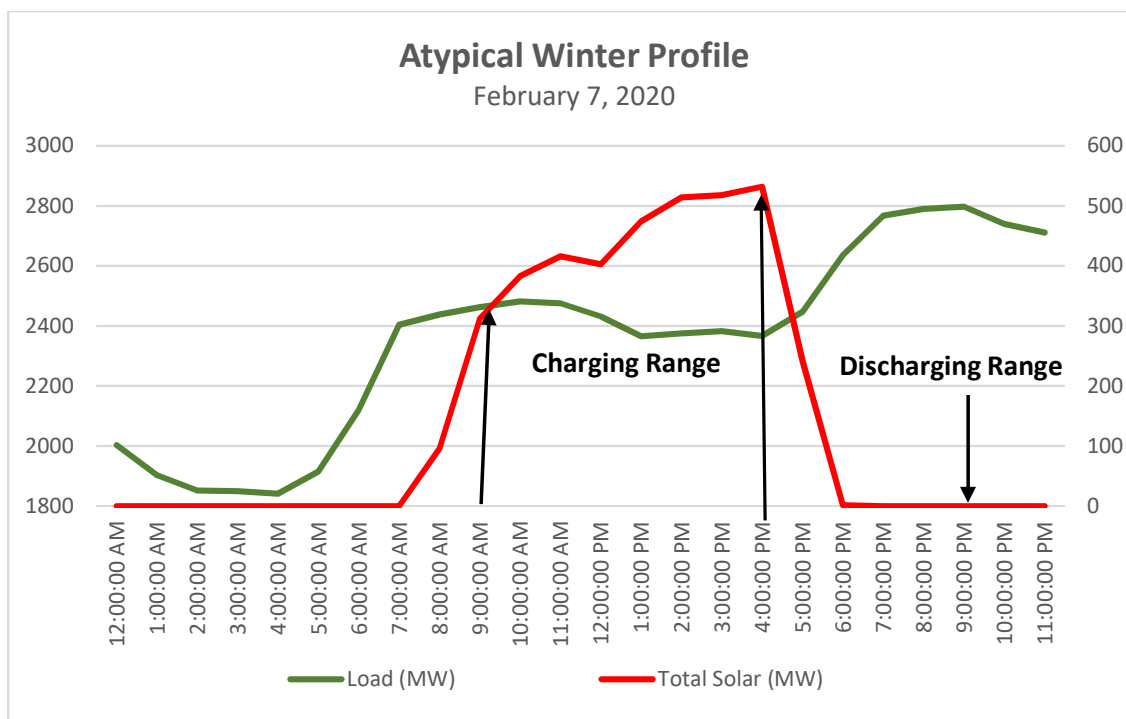


For a typical winter morning, load peaks just prior to sunrise when solar is unavailable and DESC's non-solar generators are near maximum output. As the sun rises, system load begins to decrease and DESC generation begins to ramp down to lower levels to maintain a balanced system. At the same time, solar generation begins to ramp up and produce increased MW. During this time, unscheduled and non-dispatchable solar output could result in excess generation in the DESC balancing area. DESC can optimize the use of storage facilities during this time by sending signals to redirect the output of solar generation to charge Storage QFs.

DESC's BIOP would typically forecast to discharge during the following morning's peak. This will result in the discharging of stored MW for up to 4 hours around the morning peak. However, real-time conditions may reveal that the asset can be optimized by discharging for up to 4 hours across the evening peak. The decision whether to use this power in the evening or the next morning will be a real-time decision that is dependent upon weather forecasts and unit availability—again, a decision which requires the type of unique knowledge of DESC's system that only DESC possesses.

**Q. CAN YOU PROVIDE AN EXAMPLE THAT ILLUSTRATES HOW DESC PLANS TO UTILIZE BATTERY STORAGE DURING THE EVENING PEAK FOR AN ATYPICAL WINTER PROFILE?**

**A.** Yes. The graph below shows actual data from an atypical winter day in 2020.



In contrast to a typical winter day, which has a morning peak, this day contained an afternoon peak. On this day, there was a high solar output until approximately 4:00 P.M., and then a sharp decline over approximately the next two hours. In this case, discharged MW would not be needed across the morning peak, and the optimized discharge of stored MW to balance the system would begin as early as 4:00 P.M. (as solar is rapidly decreasing and load is increasing) and end around 9:00 P.M. (when load begins to decrease). The storage of MW from solar generation would occur throughout the day when loads are low and solar output is at its maximum level. Again, a day-ahead model may have provided contrary instructions.

1   **Q.    WOULD DESC’S EXPERIENCE OPERATING FAIRFIELD HELP DESC**  
2       **TO BETTER DISPATCH STORAGE FACILITIES ON BOTH TYPICAL**  
3       **AND ATYPICAL DAYS?**

4    A.       Yes. From the perspective of System Control, operation and maximization  
5       of Fairfield is similar to utility-scale solar storage facilities. I understand there are  
6       inherent differences between Fairfield and battery storage facilities—however,  
7       DESC believes that its knowledge of its system, combined with the real-time  
8       communication capability with the storage facilities, will allow DESC to optimize  
9       the dispatch of these storage facilities just as it does with Fairfield. DESC has years  
10      of experience determining when to “charge” Fairfield. For example, as generation  
11      is approaching its minimum operating limit and continues to exceed load (typically  
12      during the shoulder seasons), DESC can maintain operating limits by “charging”  
13      Fairfield. DESC will use this experience when sending dispatch instructions  
14      (charge and discharge) to Storage QFs in the same way.

15           Likewise, by allowing DESC to coordinate the dispatch of Storage QFs with  
16      DESC’s use of Fairfield, Storage QFs will provide maximum benefit to DESC’s  
17      customers. In addition to taking generation during light-load periods, both Fairfield  
18      and battery storage are quick-response resources. The coordinated use of these  
19      quick-response resources is important because the increase of non-dispatchable  
20      variable resources on DESC’s system necessarily means that resources like battery  
21      storage and Fairfield will need to respond quickly to system events and help balance  
22      the system during light load periods. DESC would view its ability to send dispatch

1 signals to battery storage facilities in real-time as simply an expansion of Fairfield  
2 and would be able to obtain similar benefits from such facilities. This means that  
3 DESC's customers will reap the maximum benefit as well because DESC would  
4 have the ability to plan for and dispatch Fairfield and battery storage facilities in  
5 conjunction with one another, rather than simply allowing them to operate  
6 independently.

7  
8 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

9 **A. Yes.**